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A METHOD OF EVALUATING COTTON GINS FOR PINK BOLLWORM KILL ^{1/}

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Previous work showed that a high kill of pink bollworms, Pectinophora gossypiella (Saunders), occurs during cotton ginning. This research also showed an increasing kill with increasing complexity of gin setup.

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^{5/} Robertson, O. T., Stedronsky, V. L., and Currie, D. H. Kill of Pink Bollworms in the Cotton Gin and the Oil Mill. U.S. Dept. Agr. Prod. Res. Rpt. 26, 22 pp. 1959.

^{6/} Robertson, O. T., Martin, D. F., Alberson, D. M., and others. Pink Bollworm Kill with Improved Gin Equipment. U.S. Dept. Agr. Prod. Res. Rpt. 73, 8 pp. 1963.

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The increased kill appeared to be related to the possible points of impact of seed cotton against the various pieces of equipment. These results led to the abolition of the quarantine regulations that required heat treatment of cottonseed during the ginning process in gins in Texas and New Mexico, and in gins with machinery that produced 95 percent or more kill of pink bollworms in Louisiana and Arkansas. Thus, new gins must be examined and evaluated, and older gins must be reevaluated when changes in gin machinery are made.

This paper describes a method for evaluating gins for pink bollworm kill, which is based on the previously reported research. 5/ 6/ However, before any gin rating is attempted, the workers should become familiar with the equipment used in the ginning process illustrated in Agriculture Handbook 260. 7/

Because the equipment setup in many gins differs from that used in the research studies, a conversion factor must be used to measure kill from different pieces of equipment. We found that conversion of the various pieces of equipment to an equivalent number of cleaning cylinders was an effective measure of pink bollworm kill. The conversion factors are as follows:

20 to 24 Shelf dryer-----2 cylinders

Bur extractor or
stick machine-----3 cylinders

Separator-----4 cylinders

Extractor feeder-----6 cylinders

Gin stand-----10 cylinders

Seed blow system-----3 cylinders

7/ Agricultural Research Service. Handbook for Cotton Ginners
U.S. Dept. Agr., Agr. Handb. 260, 121 pp. 1964.

Seed cotton cleaning equipment is rated according to the actual number of effective cylinders in the machine. Most cleaners have revolving spiked cylinders that move the cotton against stationary woven-wire screens or grid bars. (Handbook 260 ^{8/}; fig. 36 shows a 7-cylinder cleaner and fig. 37 a 6-cylinder cleaner). Another type of cleaner does not have stationary screens or grid bars (see fig. 31 and 32, Handbook 260 ^{8/}). Instead, this machine has revolving metal disks spaced about five-eighths of an inch apart that permit foreign matter, but not the seed cotton, to sift through; thus, these disks achieve the same function as stationary screens.

Machines with revolving spiked cylinders and those with revolving disk cylinders are frequently believed to have more cleaning cylinders than they actually do have. For example, the cleaner in figure 31 of Handbook 260 ^{8/} should be rated as having 7 cylinders, not 14; that in figure 32 should be rated as having 5 cylinder, not 10.

Any equipment with provision for bypass during ginning should not be counted as contributing to kill. Also an auger-type seed transport system and separators for overflow cotton that are located over the distributors should not be counted. In some gins, the cotton load is split after drying; part passes through two overhead cleaners, and the rest goes through two other cleaners. Since pink bollworms pass through only two cleaners, such a setup should be considered to have a value of only two rather than four cleaners. Also, if the speed of all cleaning and ginning equipment is not at least the minimum recommended by the manufacturer, the gin cannot be rated.

Data (see tabulation, p. 4) on the equivalent number of cleaning cylinders versus pink bollworm kill were submitted to J. U. McGuire, Jr., Biometrical Services, Agricultural Research Service, U.S. Department of Agriculture, for regression analysis. He found that the quadratic equation $\hat{Y} = 72.8 + 1.1330X - 0.01217X^2$ when $\hat{Y}$ = percent kill and X = equivalent cylinders, fitted the data.

A sample form that can be used in rating gins is presented in figure 1.

^{8/} See footnote 7, p. 2.

Number of cylinders: Percent kill

20-----	90.6
21-----	91.2
22-----	91.8
23-----	92.4
24-----	93.0
25-----	93.5
26-----	94.0
27-----	94.5
28-----	95.0
29-----	95.4
30-----	95.8
31-----	96.2
32-----	96.6
33-----	96.9

Number of cylinders: Percent kill

34-----	97.3
35-----	97.6
36-----	97.8
37-----	98.1
38-----	98.3
39-----	98.5
40-----	98.7
41-----	98.8
42-----	98.9
43-----	99.0
44-----	99.1
45-----	99.1
46+-----	99.2

Name of gin_____

Equipment item	Equivalent cylinders (each)	Number of items	Total cylinders
Drier <u>1</u> /-----	2	_____	_____
Cleaner-----Actual		_____	_____
Bur extractor or stick machine-----	3	_____	_____
Separator-----	4	_____	_____
Extractor feeder-----	6	_____	_____
Gin <u>2</u> /-----	10	_____	_____
Seed blow system-----	3	_____	_____
Total-----			_____
Percent kill-----			_____

1/ Based on 24-shelf drier without heat.

2/ If gin is operating below 600 r.p.m., it is not rated because of low kill.

Figure 1.--Sample form for rating gins for pink bollworm kill.

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